

Difference Between Epigeal and Hypogeal Germination

www.differencebetween.com

Key Difference - Epigeal vs Hypogeal Germination

Germination is the process in which a seed undergoes development and become a mature plant. There are different morphological and growth phases of the germination process. Appropriate optimal levels of warmth, moisture along with the correct nutrients are necessary for the germination process of the seed to form seedlings and finally become mature into a new plant. Seed germination can be categorized into two main types namely, Epigeal Germination of seeds and Hypogeal Germination of seeds. This categorization is based on the direction in which the seedlings grow upon germination. Epigeal germination is the process in which the seed leaves or the **cotyledons** are brought on to the soil surface along with the **shoot** during germination. Hypogeal germination is the process in which the seed leaves or the cotyledons remain below the soil surface during germination. The **key difference** between epigeal and hypogeal germination is that **in epigeal germination, the hypocotyl extends and the cotyledons come out of the ground while in hypogeal germination the epicotyl extends, and the cotyledons stay in the ground.**

What is Epigeal Germination?

In the process of epigeal germination, the seed leaves or the cotyledons are brought up to the surface along with the development of the shoot. This is mainly due to the rapid elongation of the hypocotyl of the plant. During the epigeal germination, the hypocotyl grows rapidly and actively and becomes curved or curled in appearance. This change in the hypocotyl allows the seed leaves or the cotyledons to come on top of the soil surface. After the cotyledons are brought on to the surface, the hypocotyl straightens which will later result in the seed coat to fall off, and eventually, the cotyledons will appear to be green. The resulting epicotyl will then begin its growth phase. The epicotyl will eventually mature and give rise to mature green leaves, and the cotyledons will fall off.

The main features of epigeal germination are;

- The radicle emerges first to form the hypocotyls.
- The plumule develops late.
- The hypocotyl initially forms a loop and then extends.
- The cotyledons are brought to the surface and thereby produce the initial leaves followed by shoot development.

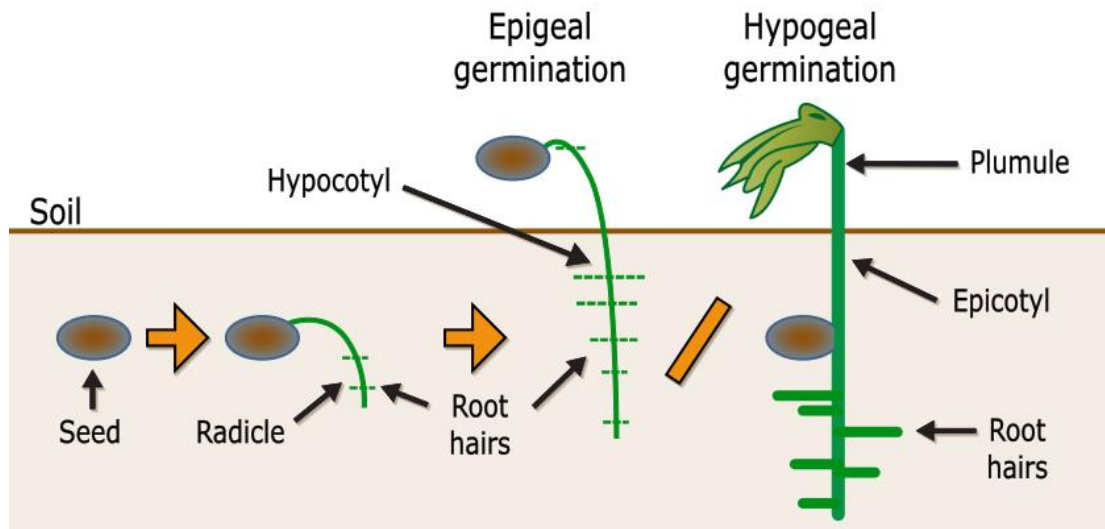


Figure 01: Epigeal and Hypogeal Germination

Examples for epigeal seed germination are monocotyledonous albuminous seeds ([onion](#)), dicotyledonous albuminous seeds (castor), monocotyledonous exalbuminous seeds (*Alisma*) and dicotyledonous exalbuminous seeds ([bean](#)).

What is Hypogeal Germination?

During hypogeal germination of seeds, the cotyledons remain below the soil surface. This is due to the rapid development and elongation of the epicotyl. The epicotyl initially develops, and then it elongates, followed by curling up and attaining a curved structure. As a result, in the early development of the plumule it emerges above the soil surface. This results in the cotyledons to remain below the soil surface. The plumule elongates fast in the case of hypogeal germination, and the plumule ruptures the coleoptile and undergoes further growth. The ruptured plumule grows to the radicle and is replaced by the root system.

The main features of hypogeal germination are;

- It is the type of an in situ seed germination where the cotyledons remain in the soil.
- The radicle develops to form the root system.
- The plumule develops into the shoot system.

Examples of hypogeal germination are monocotyledonous exalbuminous seeds (arum), dicotyledonous exalbuminous seeds (gram, pea), monocotyledonous albuminous seeds (water lily) and monocotyledonous albuminous seeds (maize).

What are the Similarities Between Epigeal and Hypogeal Germination?

- Both are types of germination of seeds.

- Both are dependent on the direction of the cotyledon.

What is the Difference Between Epigeal and Hypogeal Germination?

| Epigeal vs Hypogeal Germination | |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Epigeal germination is the process in which the seed leaves or the cotyledons are brought on to the surface along with the shoot during germination. | Hypogeal germination is the process in which the seed leaves or the cotyledons remain below the soil surface during germination. |
| Structure showing a greater Elongation | |
| The hypocotyl is elongated in epigeal germination. | Epicotyl is elongated in hypogeal germination. |
| Curling | |
| The terminal of hypocotyl is curved to protect the cotyledon in epigeal germination. | The terminal of the epicotyl is curved to protect the plumule from hypogeal germination. |

Summary - Epigeal vs Hypogeal Germination

Seed germination is an important and a vital process in plant development. There are two main methods in which seed germination takes place which are, epigeal germination and hypogeal germination. These depend on the cotyledon position in the initial development process. In epigeal germination, the cotyledons are brought above the soil surface whereas in hypogeal germination the cotyledons remain in the soil. This is the difference between epigeal and hypogeal germination.

Reference:

1. "Types of germination." Biology for Everybody. [Available here](#)
2. "TYPES OF SEED GERMINATION: EPIGEAL, HYPOGEAL GERMINATION, VIVIPARY." BrainKart. [Available here](#)

Image Courtesy:

1. 'Germination-en' By Germination.svg, [\(CC BY-SA 3.0\)](#) via [Commons Wikimedia](#)

How to Cite this Article?

APA: Difference Between Epigeal and Hypogeal Germination.(2017 December 29). Retrieved (date), from <http://differencebetween.com/difference-between-epigeal-and-vs-hypogeal-germination/>

MLA: "Difference Between Epigeal and Hypogeal Germination" Difference Between.Com. 29 December 2017. Web.

Chicago: "Difference Between Epigeal and Hypogeal Germination." Difference Between.Com. <http://differencebetween.com/difference-between-epigeal-and-vs-hypogeal-germination/> accessed (accessed [date]).



Copyright © 2010-2017 Difference Between. All rights reserved